

CLAIMS

1.- A multiband antenna comprising a multilevel structure characterized in that at least two polygons of the multilevel structure are spaced by means of a non-
5 straight gap shaped as a space-filling curve, in such a way that the whole gap length is increased yet keeping its size.

2.- A multiband antenna according to claim 1 wherein the space-filling curve approaches a fractal shape or curve.

10 3.- A multiband antenna according to claims 1 or 2, wherein the multilevel structure is composed by at least eight rectangles, a first rectangle being capacitively coupled to a second rectangle, said second rectangle being connected at one tip to a first tip of a third rectangle, said third rectangle being
15 substantially orthogonal to said second rectangle, said third rectangle being connected at a second tip to a first tip of a fourth rectangle, said fourth rectangle being substantially orthogonal to said third rectangle and substantially parallel to said second rectangle, said fourth rectangle being connected at a second tip to a first tip of a fifth rectangle, said fifth rectangle being substantially orthogonal to
20 said fourth rectangle and substantially parallel to said third rectangle, said fifth rectangle being connected at a second tip to a first tip of a sixth rectangle, said sixth rectangle being substantially orthogonal to said fifth rectangle and substantially parallel to said fourth rectangle, said sixth rectangle being connected at a second tip to a first tip of a seventh rectangle, said seventh rectangle being
25 substantially orthogonal to said sixth rectangle and parallel to said fifth rectangle, said seventh rectangle being connected to a first tip of an eighth rectangle, said eighth rectangle being substantially orthogonal to said seventh rectangle and substantially parallel to said sixth rectangle.

30 4.- A multiband antenna according to claims 1 or 2, wherein the multilevel structure is composed by at least eight rectangles, a first rectangle being capacitively coupled to a second rectangle, said second rectangle being connected at one tip to a first tip of a third rectangle, said third rectangle being

substantially orthogonal to said second rectangle, said third rectangle being connected at a second tip to a first tip of a fourth rectangle, said fourth rectangle being substantially orthogonal to said third rectangle and substantially parallel to said second rectangle, said fourth rectangle being connected at a second tip to a first tip of a fifth rectangle, said fifth rectangle being substantially orthogonal to said fourth rectangle and substantially parallel to said third rectangle, said fifth rectangle being connected at a second tip to a first tip of a sixth rectangle, said sixth rectangle being substantially orthogonal to said fifth rectangle and substantially parallel to said fourth rectangle, said sixth rectangle being connected at a second tip to a first tip of a seventh rectangle, said seventh rectangle being substantially orthogonal to said sixth rectangle and parallel to said fifth rectangle, said seventh rectangle being connected to a first tip of an eighth rectangle, said eighth rectangle being substantially orthogonal to said seventh rectangle and substantially parallel to said sixth rectangle, and wherein said eighth rectangle is placed between said fourth and sixth rectangles.

5.- A multiband antenna to operate at five bands according to claims 3 or 4 wherein the non-straight gap is placed between said second and fourth rectangle.

6.- A multiband antenna to operate at five bands according to any of the claims 3, 4 or 5 wherein the antenna includes at least a first and a second short-circuits between the eight-rectangle multilevel structure and the ground-plane, a first short-circuit being connected to one edge on the tip of the first rectangle of said multilevel structure and a second short-circuit being connected at one edge of the third rectangle of said multilevel structure.

7.- A multiband antenna to operate at five bands according to any of the claims 3, 4, 5 or 6, wherein the antenna includes at least a first and a second capacitive load on the multilevel structure, said capacitive load consisting on a conducting strip, said conducting strip being connected at one edge of said multilevel structure and being placed orthogonally to said multilevel structure between said multilevel structure and the ground-plane.

8- A multiband antenna to operate at five bands according to claim 7, wherein the antenna includes at least a first capacitive load connected at the second tip of the eighth rectangle.

5 9.- A multiband antenna to operate at five bands according to claims 7 or 8, wherein the antenna includes at least three capacitive loads, a first capacitive load being connected at one edge of the first rectangle of said multilevel structure, second and third capacitive loads connected at one edge of the third rectangle of said multilevel structure, wherein the second capacitive load is placed closer to
10 the second rectangle while the third capacitive load is placed closer to the third rectangle.

10.- A multiband antenna to operate at five bands according to any of the preceding claims, wherein the multilevel structure is placed at one end of a
15 rectangular ground-plane and parallel to said ground-plane.

11.- A multiband antenna to operate at five bands according to any of the preceding claims, wherein the antenna is fed by means of a straight pin to a point
20 on the second or third rectangle of said multilevel structure and wherein the antenna is matched below a $VSWR < 3$ at the frequency bands of the following five wireless services: GSM900, GSM1800, PCS1900, UMTS and 2.4GHz.

12.- A multiband antenna to operate at five bands according to any of the preceding claims, wherein the multilevel structure is placed over a Multilevel and
25 Space-Filling Ground-Plane which includes at least two conducting surfaces, said conducting surfaces being connected by at least a conducting strip, said strip being narrower than the width of any of said two conducting surfaces.

13.- A multiband antenna to operate at five bands according to any of the preceding claims, wherein the multilevel structure is placed over a rectangular
30 ground-plane, said ground-plane including at least one slot at least one of its edges.

14.- A multiband antenna to operate at five bands according to any of the preceding claims wherein the antenna is placed inside a cellular phone or handheld wireless terminal.